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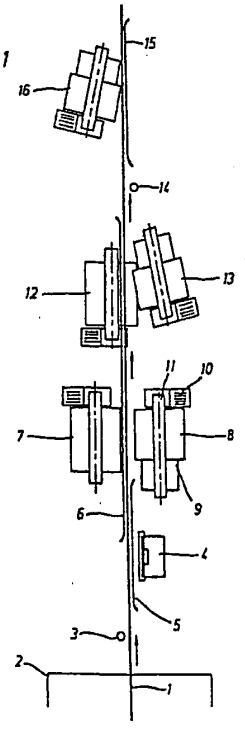
(54) An apparatus for the surface treatment of carcasses.

(57) An apparatus, for the surface treatment of a carcass suspended from its hind legs, having brushing or scraping devices (7, 8, 12, 13, 14) for treatment of exterior or interior surface parts of the carcass. The apparatus comprises a detector (4) for direct or indirect determination of the length of the carcass, which detector adjusts the operating level of one or more following devices (7, 8, 12, 13, 16) which are automatically raised, lowered or varied in accordance with the carcass length determined by the detector.

When the level of the brushing or scraping devices has been adjusted the devices will treat the surface parts for which they have been designed.

FIG. 1



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An Apparatus for the Surface Treatment of Carcasses

The present invention relates to an apparatus, for the surface treatment of carcasses conveyed mechanically suspended from their hind legs, comprising at least one surface treating device, such as a brushing and/or scraping device, for treatment of a specific surface part on the exterior or interior of such carcass.

After scalding, dehairing and singeing, pig carcasses are subjected to a number of mechanical or manual surface treatments in order to achieve a clean rind surface of uniform appearance.

Known apparatus for such surface treatments, however, have proved inadequate for use with carcasses which although of substantially even weight are of varying length, and there has been a sharply increasing trend toward varying the length of porkers in recent years. As an example, the so-called Danish Landrace pig is being replaced for reasons of production economy by, or crossed with, four or five other breeds of pigs, to the effect that variation in length of Danish porkers is now as much as 50 cm in extreme cases, while

the standard deviation is in the order of 5 to 10 cm.

Known apparatus with stationary surface treating devices designed to treat some specific surface part, such as forehead, neck, forelegs etc. of a carcass now and then will fail to treat the desired area, and it should be noted that the said variation in carcass length must be expected to show a further increase henceforth.

According to the invention an apparatus as set out above is characterised in that it comprises a detector for determination of the length of each carcass, and adjusting means for automatically raising, lowering or varying the operating level of one or more following surface testing devices in accordance with the carcass length determined by the detector.

In modern bacon factories each carcass is transported suspended from a gambrel, and is normally conveyed with a specific orientation relative to the travelling direction.

Accordingly, in a first embodiment the detector comprises a device movable upwards and downwards, and having an upper part which is formed as a horizontal beam for detecting the length of the carcasses by contact from below with the forelegs of the carcasses.

This provides a simple and efficient method of determining the length of each carcass, as the forelegs

are centrally positioned in relation to the working areas of a number of the surface treating devices.

In a further embodiment the upper surface of the beam facing the forelegs of the carcasses consists of electrically conductive material which is insulated from the beam, said material forming one electrode in an electric detector circuit, while the gambrel forms the other electrode in said circuit.

This will result in reliable electrical detection of the detector having contacted the forelegs, this being preferable to a direct mechanical contact pressure detection which can cause uncertain detection, and at times has the effect of pushing a carcass aside or down from the gambrel.

As the detector usually starts from below from a given initial position when a carcass to be measured is within a given interval in terms of time and/or horizontal distance from the detector, this has the effect that a long carcass will be detected more quickly than a short one, and due to the normally steady travelling speed of the carcasses, a long or a short carcass will not as a result have the same horizontal position in relation to the detector. For this reason in particular it has proved advantageous to use a detection beam having an upper surface with a length substantially greater than the normal horizontal spacing between the forelegs of a

carcass.

In a further embodiment the detector device and adjusting means comprise a row of pins, such as bolts, with uniform, or concordant lateral, spacing, and a stationary counter actuated by upward and downward movement of the row of pins, this measuring length and making any necessary adjustment of the operating level, and if desired of the operating range, of the surface treating devices.

This structure has proved to be extremely simple and reliable in the very damp and hot slaughterhouse climate.

An apparatus according to the invention, for brushing with horizontal rotating brush rollers, may comprise a forehead brushing device, an opposing front-breast brushing device, a neck brushing device following the forehead brushing device in the direction of carcass movement, an opposing foreshank-neck brushing device, a device for turning each gambrel through 180^{o}, and a further foreshank-neck brushing device following the neck brushing device.

The extremely compact embodiment defined above comprising a combination of surface treating devices has proved adequate for the achievement of completely clean carcasses, without any supplementary manual treatment.

It has proved advantageous from the viewpoint of

control techniques, but more important in terms of treatment efficiency, to cause the surface treating devices to move - after completed treatment of a given carcass - to an upper or lower initial position prior to adjustment to the next carcass length. This has proved particularly important with regard to treatment of the forelegs.

Accordingly, in a further embodiment at least one of the surface treating devices is adapted to be moved to an upper or lower initial position after treatment of any given carcass and more specifically, the front-breast brushing device may be adapted to be moved to an upper initial position, while the other brushing devices are adapted to be moved to a lower initial position after treatment of any given carcass.

After adjustment in accordance with carcass length at least one surface treating device may be moved up and down during treatment of any given carcass.

Furthermore, the amplitude of the movement of said device upwards and downwards may be determined in accordance with the carcass length measured.

The above mentioned embodiments have proved especially advantageous in connection with mill scraping of the ham of carcasses, since although the variation in ham level from carcass to carcass is not all that great due to its proximity to the suspension point, the

vertical length of the ham itself has proved to vary concurrently with the variation in carcass length.

It should be noted that the detection of length in apparatus according to the invention may be used with the same advantage, for other operations such as interior cleaning of the neck of split pig carcasses, automatic removal of the foreleg hooves, in the longitudinal mechanical removal of the spinal marrow, and for branding and other stamping purposes.

The invention will now be described by way of example with reference to the drawings, in which:-

Figure 1 is a schematic elevational view of an apparatus according to the invention, comprising a length detector and five brushing devices controlled by the detector;

Figure 2 is a side view of the length detector of Figure 1 in the travelling direction of the pig carcasses; and

Figure 3 shows one of the five brushing devices of Figure 1, viewed as in Figure 2.

Figure 1 shows a sliding bar 1, a known scraping machine 2, a device 3 for turning gambrels, a length detector 4, a first gambrel guide rail 5, a second gambrel guide rail 6, a forehead brushing device 7, a front-breast brushing device 8 with double roller brush 9, a motor unit 10 and a suspension device 11, a neck

brushing device 12, a "right" foreshank-neck brushing device 13, a device 14 for turning gambrels, a third gambrel guide rail 15 and a "left" foreshank-neck brushing device 16.

Figure 2 shows a pig carcass 17 suspended from a gambrel 18 which is mechanically conveyed on the sliding bar 1. Below this will be seen the length detector 4 which has a base 19 secured to the floor and an upper outer column 20 which is hydraulically movable up and down in relation to the base 19, thereby actuating by means of passing pins 22 a stationary electronic counter 21. At the top of the column 20 is a horizontal beam 23, whose upper surface has an electrically conductive blade 24 provided with a low-voltage potential in relation to the sliding bar 1, with the effect that there is established electric connection through the pig carcass 17 when the pig's forelegs 25 contact the beam 23.

Figure 3 shows a pig carcass 26, and, as an example, the front-breast brushing device 8. This device is secured to the ceiling by means of a suspension frame 27. The roller brush 9 itself hangs from the device 11 to which is secured an outer column 28 provided with pins 29.

The outer column 28 and with it the brush roller 9 are hydraulically movable in slightly inclined direction relative to the frame 27 which carries an electronic

counter 30.

The apparatus shown functions as follows:

When a pig carcass leaves the scraping apparatus 2 with the back leading in Figure 1, it is turned through 90° left by the device 3 so that the forelegs are oriented to the right, in which position they are held by the first gambrel guide rail 5. When the carcass is moved past a given point, e.g. the device 3, the outer column 20 (Figure 2) of the length detector begins to move up toward the forelegs 25 of the pig carcass 17, while the counter 21 records the number of passed pins 22. When the electrically conductive blade 24 contacts the pig's forelegs 25, the recording of the counter 21 is stored, and the detector 4 instantly moves down again to its initial position, which is also the case if the electrically conductive blade 24 for some reason or other, e.g. missing pig or the like, has made no contact on its way to its top position.

The stored record of the pig carcass length, expressed by the distance from the slide bar 1 to the forelegs 25, is then correlated via a microprocessor to the relative position of the measured pig carcass on the sliding bar 1.

When the subject pig carcass has been advanced to be near the brushing device 8, the latter is moved toward an upper initial position, indicated by I (Figure

3). After this the device 8 is moved downwards to the specific positions II and II, these being determined by means of the counter 30 in accordance with the stored signal from the detector counter 21.

The device 8 will be reciprocated between positions II and III during the remainder of the processing cycle of the pig carcass at the device 8. At the same time, the device 7 (Figure 1) has completed its operating cycle, starting from a lower initial position prior to the desired length adjustment.

The pig carcass then moves on, being oriented as before due to the rail 6 (Figure 1), through the brushing devices 12 and 13, which are adjusted in similar manner, and the carcass is finally turned 180^{o} by the device 14 and held in this position by means of the rail 15 during passage past the brushing device 16, the level of which is adjusted in a similar manner.

The system described above may be modified to extend the distance between II and III in case of long pigs, just as it will be possible to prolong the duration of a given processing cycle in a given device for a long pig carcass compared to a short one.

CLAIMS:

1. An apparatus, for the surface treatment of carcasses conveyed mechanically, suspended from their hind legs, comprising at least one surface treating device, such as a brushing and/or scraping device (7, 8, 12, 13, 16) for treatment of a specific surface part of the exterior or interior of each carcass, characterised in that the apparatus comprises a detector (4) for determination of the length of each carcass (17), and adjusting means for automatically raising, lowering or varying the operating level of one or more following surface treating devices (7, 8, 12, 13, 16) in accordance with the carcass length determined by the detector (4).

2. An apparatus according to Claim 1, in which the carcasses are suspended from gambrels (18) characterised in that the detector (4) comprises a device (20) movable upwards and downwards and having an upper part which is formed as a horizontal beam (23) for detecting the length of the carcasses by contact from below with the forelegs (25) of the carcasses.

3. An apparatus according to Claim 2, characterised in that the upper surface of the beam (23)

facing the forelegs (25) of the carcasses consists of electrically conductive material (24) which is insulated from the beam, said material (24) forming one electrode in an electric detector circuit, while the gambrel (18) forms the other electrode in said circuit.

4. An apparatus according to Claim 3, characterised in that the upper surface of the beam (23) has a length substantially greater than the normal horizontal spacing between the forelegs (25) of a carcass.

5. An apparatus according to Claim 1, characterised in that the detector (4) and the adjusting means comprise a row of pins (22, 29) with uniform spacing, and a stationary counter (21, 30) actuated by upward and downward movement of the row of pins (22, 29).

6. An apparatus according to any preceding claim for brushing with horizontal rotating brush rollers, characterised in that the apparatus comprises a forehead brushing device (7), an opposing front-breast brushing device (8), a neck brushing device (12) following the forehead brushing device in the direction of carcass movement, an opposing foreshank-neck brushing device (13), a device (14) for turning each gambrel through 180^{o}, and

and a further foreshank-neck brushing device (16) following the neck brushing device (12).

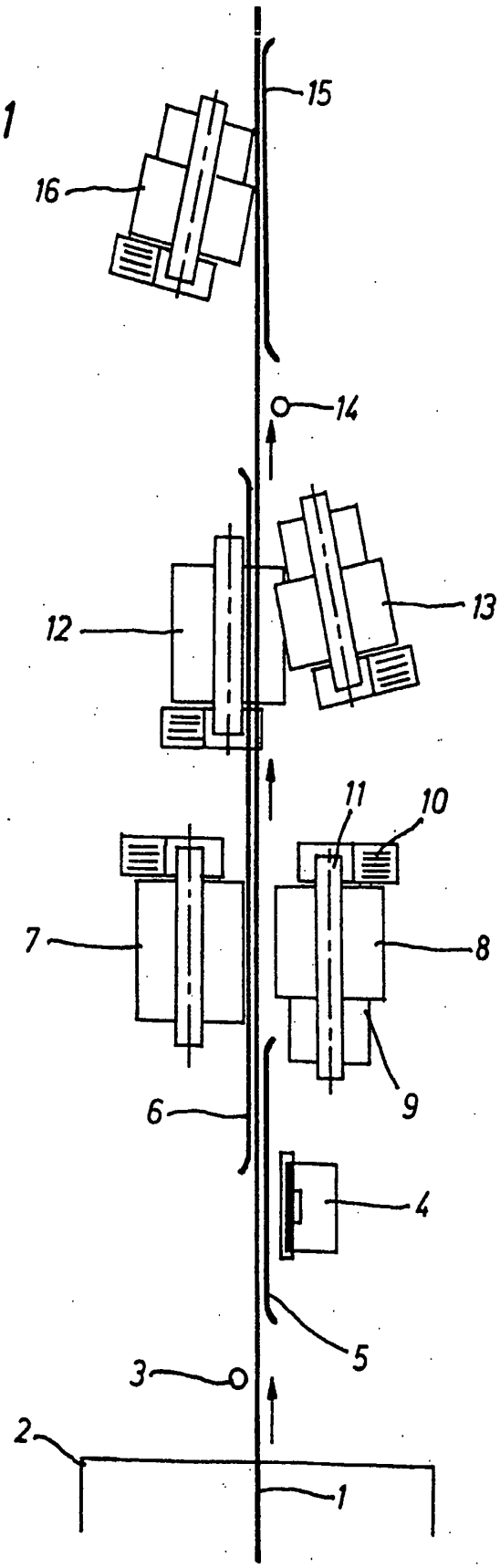
7. An apparatus according to any preceding claim, characterised in that at least one surface treating device (7, 8, 12, 13, 16) is adapted to be moved to an upper or lower initial position after treatment of any given carcass.

8. An apparatus according to Claim 7 as dependent upon Claim 6, characterised in that the front-breast brushing device (8) is adapted to be moved to an upper initial position, while the other brushing devices (7, 12, 13, 16) are adapted to be moved to a lower initial position after treatment of any given carcass.

9. An apparatus according to any preceding claim, characterised in that after adjustment in accordance with carcass length at least one surface treating device (18) is moved up and down during treatment of any given carcass.

10. An apparatus according to Claim 9, characterised in that the amplitude of the movement of said device (8) upwards and downwards is determined in accordance with the carcass length measured.

FIG. 1



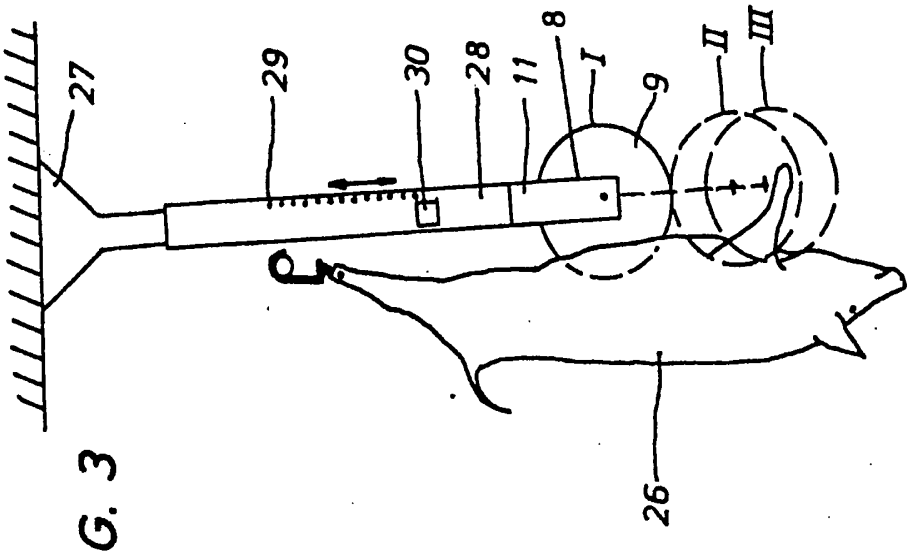


FIG. 3

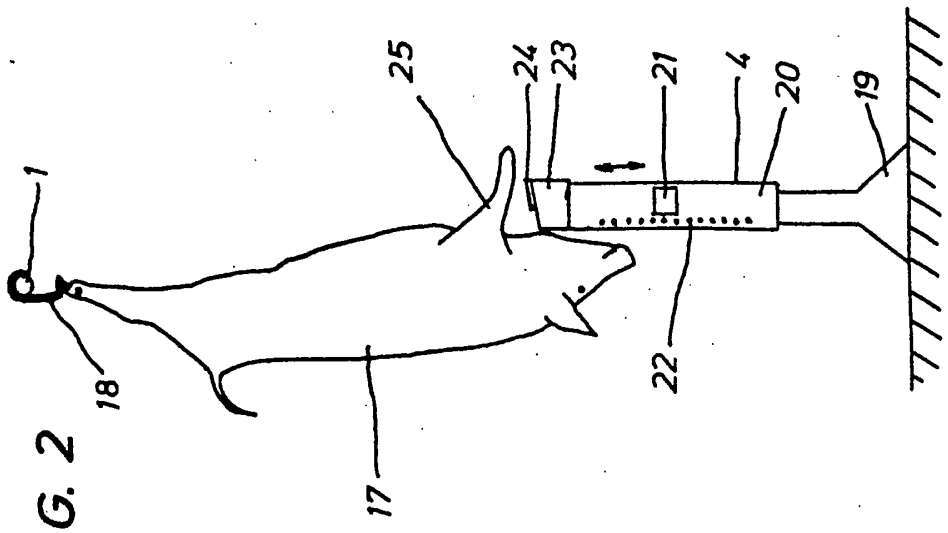


FIG. 2